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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/672,269	09/26/2003	Scott G. Walton	NC 83,217	8821

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EXAMINER

BUEKER, RICHARD R

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 07/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/672,269

Applicant(s)

WALTON ET AL.

Examiner

Richard Bueker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) 9-13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 14 and 15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 5/3/04; 5/7/04
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_

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Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-8 and 14-15, drawn to an apparatus, classified in class 156, subclass 345.4.
- II. Claims 9-13, drawn to a process, classified in class 216, subclass 67.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus can be used to form a low density plasma or one that is discontinuous in time.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Ms. Ferret on June 15, 2005 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-8 and 14-15. Affirmation of this election must be made by applicant in replying to this Office action. Claims 9-13 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one

or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

The drawings are objected to because element 106 of Fig. 1 is not identified in the specification. Element 106 must be deleted from Fig. 1. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The specification is objected to because the drawing element number 102 used throughout the specification to refer to the electron beam is not in the drawings. Fig. 1

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uses number 112 to refer to the electron beam, and "102" in the specification should be changed to "112". Also, element 205 of Fig. 2 is not identified in the specification.

Claims 4, 5, 14 and 15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In claims 4 and 5, the recited "mixture" of gas is not enabled because the specification fails to disclose any gas mixture compositions. In claim 4, the phrase "non-halogen gases" is not found in the specification. In claim 14, lines 10-11, the phrase "the strength and polarity of the walls of the processing chamber is altered to control the rate at which charge is accumulated on the surface of the substrate material" is not contained in the specification and lacks enablement.

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: In claim 4, the phrase "non-halogen gases" is not found in the specification. Also, the phrase "the strength and polarity of the walls of the processing chamber is altered to control the rate at which charge is accumulated on the surface of the substrate material" lacks antecedent basis in the specification.

Claims 1-8 and 14-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "large concentration" in claims 1-8 and 14-15 is a relative term which renders the claim indefinite. The term "large

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concentration" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is noted that the specification fails to disclose any numerical value for "concentration" of any material. The same issue exists for the phrases "high energy electron beam" and "dense plasma" used in claims 1-8 and 15. In claim 2, lines 4 and 5, the phrase "the cold free electrons" lacks proper antecedent basis. In claims 2-8, line 1 of each, the phrase "(t)he source" lacks proper antecedent basis, and it is unclear if this phrase is intended to refer to the claim 1 recitation of "(a)n ion-ion plasma source" or "an electron source". The phrase "(t)he source" in claims 2-8 should be changed to "the ion-ion plasma source". In claim 4, "mixture" should be changed to "a mixture". In claim 14, line 10, the phrases "the strength" and "the walls" lack proper antecedent basis and it is unclear what these phrases refer to. In claim 14, line 10, it is unclear what is meant by "is altered". This term implies a "before" and "after" condition, but the claim fails to indicate any "before" condition that can be used as a comparison to determine an "after" condition. It is noted also that "is altered" is a verb indicating a process, while claim 14 is an apparatus claim.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 14 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ohtake (6,054,063), Kitagawa (6,410,450) or Savas (5,983,828), who all disclose plasma etching apparatus in which negative and positive ions are present in the plasma, Regarding lines 9-11 of claim 14, this is a process limitation that does not so limit the apparatus claimed in claim 14. The apparatus of Ohtake, Kitagawa and Savas all have an inherent capability of being so used. Applicants have not defined the length of time in the phrase "continuous in time" and thus this phrase includes a short time period as in a pulsed plasma.

Claim 14 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ohtake (6,054,063) in view of applicants' description of the prior art. If for argument's sake, the masked substrate referred to in claim 14 were considered to be part of the claimed apparatus, it would have been obvious to use a masked substrate in Ohtake's apparatus in view of applicants' description of the prior art (page 1, lines 11-13 of applicants' specification).

Claims 1-8 and 14-15 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Walton I (Applied Physics Letters vol. 81, no. 6, pp. 987-989, published August 5, 2002) (see Fig. 1), who discloses an electron beam plasma source comprising a process chamber containing halogen gas, an e-beam in a second chamber and means for confining the e-beam.

Walton teaches (page 987, para. Bridging cols. 1 and 2) that e-beam generated plasmas produce continuous ion-ion plasmas. Walton reports (page 989, last para.) that positive and negative ions can be extracted during all phases of plasma production. Therefore, the apparatus of Walton is inherently an ion-ion plasma source as recited. It is noted also that the limitations of claim 1, lines 6-9, claim 2, claim 14, lines 8-10 and claim 15, lines 7-10, are process limitations that the apparatus of Walton is inherently capable of performing. Also, Ex parte Thibault, 164 USPQ 666, indicates that the purpose to which an apparatus is to be put and expressions relating an apparatus to contents thereof during intended operation are not significant in determining patentability of an apparatus claim. Therefore, the recited halogen gas and the substrate with masking material of claim 14 do not so limit the recited apparatus claims. Also, the electrode of Walton is inherently capable of supporting a substrate to the extent required by claim 6.

Claims 1-8 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton I (Applied Physics Letters vol. 81, no. 6, pp. 987-989, published August 5, 2002) taken in further view of Neger (5,874,807), Shimizu (5,413,663) and applicants' description of the prior art. Neger (col. 1, lines 12-13) and Shimizu (abstract and col. 8, lines 56-68) both teach the use of an electron beam plasma to etch a substrate. Shimizu specifies halogen gases such as  $\text{Cl}_2$  and  $\text{CF}_4$ . Also, applicants' description of the prior art (page 1, lines 11-13 of applicants' specification) teaches that the use of a masked substrate for etching is conventional. If, for argument's sake, the claims were considered to require a halogen gas and a masked substrate, it would have been



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obvious to provide them in the apparatus of Walton, in view of Neger, Shimizu and applicants' description of the prior art.

Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton I (Applied Physics Letters vol. 81, no. 6, pp. 987-989, published August 5, 2002) taken in further view of Neger (5,874,807), Shimizu (5,413,663) and applicants' description of the prior art as stated above, taken in further view of Savas (5,983,828) (col. 8, lines 23-25) who teaches the use of a mixture of halogen based gas and argon for etching in an ion-ion plasma, and it would have been obvious to use the mixture of Savas to etch in an electron beam plasma as taught by Neger and Shimizu.

Regarding applicants' IDS filed May 7, 2004, the last citation on page 1 (Walton et al., "Ion flux and energy distributions at electrode surfaces in LAPPS", Pulsed Power Plasma science, 2001. IEEE conference Record – Abstracts, 17-22, page 385 (June 2001)) has not been initialed, because it is unclear what the notation "17-22" refers to. Only one page (numbered 385) was submitted. If this reference includes more pages they should be submitted to clarify the record.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

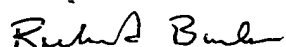
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (571) 272-1431. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parvis Hassanzadeh can be reached on (571) 272-1435. The fax phone

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number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Richard Bueker  
Primary Examiner  
Art Unit 1763